LESSON 4 Guess Who?

Lesson at a Glance

Students investigate some of the technologies used to study and monitor marine wildlife, including devices that enable scientists to listen as well as see living animals and their behaviors. Other devices help in tracking their movements as they forage for food, migrate to other areas, and interact with each other as well as with their predators. Data obtained with these devices provide information on human activities that threaten animal survival. Students discuss how this information can be used to enact and enforce laws to protect marine animals.

Lesson Duration

Two 45-minute periods

Essential Question(s)

How has technology affected our ability to study plant and animal species in Hawai‘i?
How can information obtained through this technology be used to protect threatened and endangered species?

Related HCPSIII Benchmark(s):

Science SC.4.5.3
Describe how different organisms need specific environmental conditions to survive.

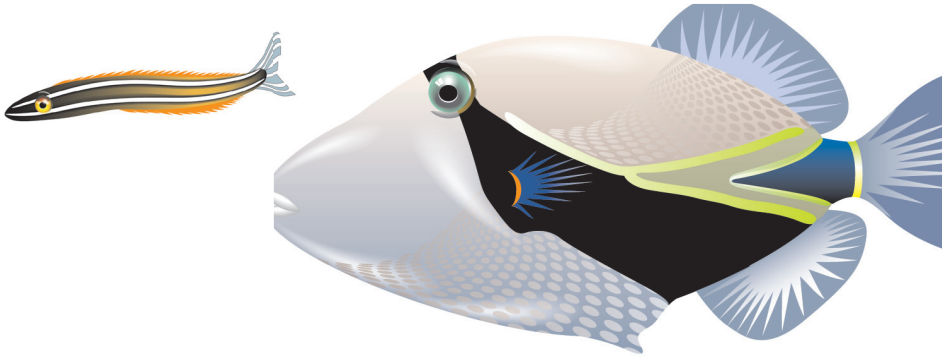
Science SC.4.2.1
Describe how the use of technology has influenced the economy, demography, and environment of Hawai‘i.

Key Concepts

- Technology enables us to collect data and information to monitor and protect plant and animal species.
- Wildlife tracking satellites help scientists to observe and investigate animals in their natural environment.
- Small tracking devices are attached to animals that record visual and/or sound images of the animal and its actions. Information recorded by the small tracking devices is sent via tiny transmitters to receiving devices.
- GPS devices record the exact locations of the tracking information data. Satellites and computer analysis of data enable monitoring of animal activity patterns and tracking of the range and movements of these animals over wide areas of their natural habitat.
- Based on data collected by technological devices, laws are created to protect and help manage plant and animal species.

Instructional Objectives

- I can describe how technology tracks marine animals.
- I can describe how laws and actions of humans can help to protect these animals.
- I can describe how technology enables us to collect data that can support laws to protect organisms.



Assessment Tools

Benchmark Rubric:

Topic		Science, Technology, and Society	
Benchmark SC.4.2.1		Describe how the use of technology has influenced the economy, demography, and environment of Hawai‘i	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Explain how the use of technology has influenced the economy, demography, and environment of Hawai‘i and suggest ways to conserve the environment	Describe how the use of technology has influenced the economy, demography, and environment of Hawai‘i	Give examples of how the use of technology has influenced the economy, demography, and environment of Hawai‘i	Recognize that the use of technology has influenced the economy, demography, and environment of Hawai‘i
Topic		Unity and Diversity	
Benchmark SC.4.5.3		Describe how different organisms need specific environmental conditions to survive	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Explain why different organisms need specific environmental conditions to survive	Describe how different organisms need specific environmental conditions to survive	List specific environmental conditions that organisms need to survive	Recall that organisms need specific environmental conditions to survive

Assessment/Evidence Pieces

Lesson

- Student Worksheet: *Using Technology to Track Marine Animals*

Materials Needed

Teacher	Class	Group	Student
• Method to present PowerPoint • PowerPoint *Using Technology to Track Marine Animals*	• None	• None	• None

Instructional Resources

Teacher Reading: *Using Technology to Track Animals*
PowerPoint: *Using Technology to Track Marine Animals*
Student Worksheet: *Using Technology to Track Marine Animals*

Student Vocabulary Words

breeding behaviors: how an animal courts, nests, reproduces, and rears young.
critical habitat: the living space that is important for the survival of the species.
migration: the periodic movement of a group or species from one region to another.
population size: the number of individuals in a population.
range: the geographic area a species occupies.
receivers: electronic devices that convert a signal from a transmitter into useful information, such as migratory patterns, or air or water temperature.
transmitters: electronic devices that send a signal to a receiver.

Lesson Plan

Lesson Preparation

- Read the Science Background provided in the Unit's Overview and Teacher Reading: *Using Technology to Track Animals*.
- Make copies of the Student Worksheet: *Using Technology to Track Animals*, included later in this lesson.
- Visit website: http://www.topp.org/ to learn about currently tagged animals.

I. *What technologies are being used to monitor the marine animals we have been studying?*

A. Introduce the lesson by telling students that they have studied various endangered species as well as how environmental conditions can change. In this lesson, they will study the technology that allows scientists to gather information about animals to better protect them against changing conditions.
B. Distribute the worksheet: *Using Technology to Track Marine Animals* to students. Point out that they are going to learn about four types of technology, and that they will need to think about how best to use this information to write a simple law to protect the marine animals. Make sure students review the worksheet and understand that they will need to develop laws.
C. Show the PowerPoint slide show *Using Technology to Track Marine Animals.* Use the notes in the PowerPoint to guide the discussion.
D. Give students in pairs enough time to complete the worksheet.

II. *Check for Understanding*

A. Each pair should share how they could protect their animal species.
B. As students trade worksheets and summarize each other's ideas, circulate among the groups of four to identify any areas of confusion or complexity in the ideas students have written.
C. Ask pairs to share their ideas with the entire class.

Extended Activities

1. Students use a digital camera to observe and record activities of fish in an aquarium, or wild birds. Have the students write an imaginary/fiction piece about their pictures and what is happening to the animal, what they imagine the animal is thinking or planning to do next.

2. Show an example of a wildlife documentary, perhaps from National Geographic, NOVA, or another source. Identify the technologies used, the kinds of data collected, and how the data were used to better understand the specific environmental conditions needed by an organism to survive.

Lesson 4 Teacher Reading

Using Technology to Track Marine Animals

Before marine animals can be tracked, they need to be fitted with either a transmitter or a camera, or their position must be noted by an observer. Once the device is attached, scientists can begin to learn more about the precise location of the animal, its range of travel in a normal day, its migration route, and in the case of the camera, its interactions with the world around it.

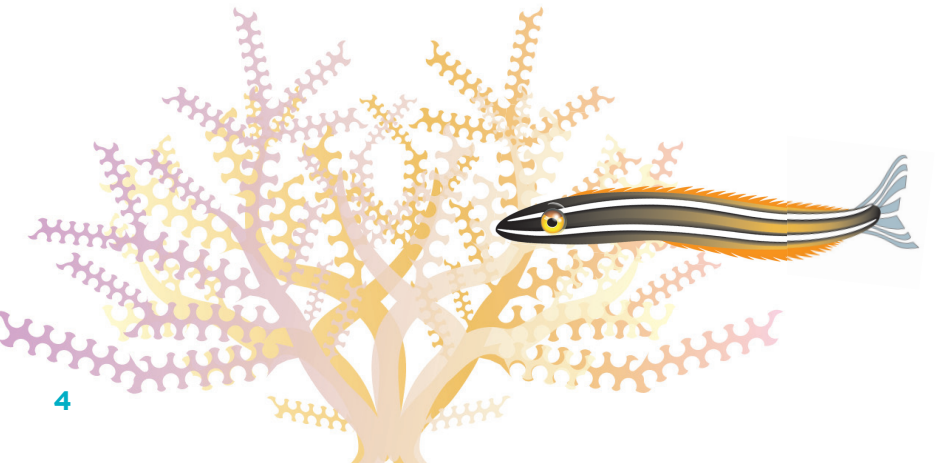
The following present a brief overview of four types of technology used to track marine animals:

Radio Transmitters have been used for a long time to track wildlife. Tiny transmitters are attached to the animal. These transmitters send the location of the animal back to a radio.

Satellites are also used to track marine animals. Satellites are a newer type of technology than the radio transmitters. Much like the radio transmitters, devices are attached to the animal and transmit the location of the animal to the satellite. The satellite then re-transmits this information to Earth.

Cameras can be attached to a marine animal and give a much wider range of data on the animal than simply its location. A camera can reveal the interactions that an animal has with the world around it.

Global Positioning Devices use the Global Positioning System (GPS), a network of 24 satellites that work in tandem, to give absolutely precise locations of the marine animal. GPS is often used during aerial or marine surveys by scientists to locate a specific animal and give a specific location.



Lesson 4 Using Technology to Track Marine Animals

NAME_____ Date_____

Directions: As you view the PowerPoint slide show, ***Using Technology to Track Marine Animals,*** take notes below to answer the questions. Then write your notes in complete sentences to answer the questions.

1. Radio Transmitters

   Describe the Technology:

   Describe how it tracked an animal:

   What information did this device provide?

   How can I use this information to protect animals?

2. Satellites

   Describe the Technology:

   Describe how it tracked an animal:

   What information did this device provide?

   How can I use this information to protect animals?

3. Cameras

Describe the Technology:

Describe how it tracked an animal:

What information did this device provide?

How can I use this information to protect animals?

4. GPS

Describe the Technology:

Describe how it tracked an animal:

What information did this device provide?

How can I use this information to protect animals?